RSU & OBU Automated Testing System

Doewe Technologies Application Notes-020-V1.0

https://www.doewe.com

1. Overview

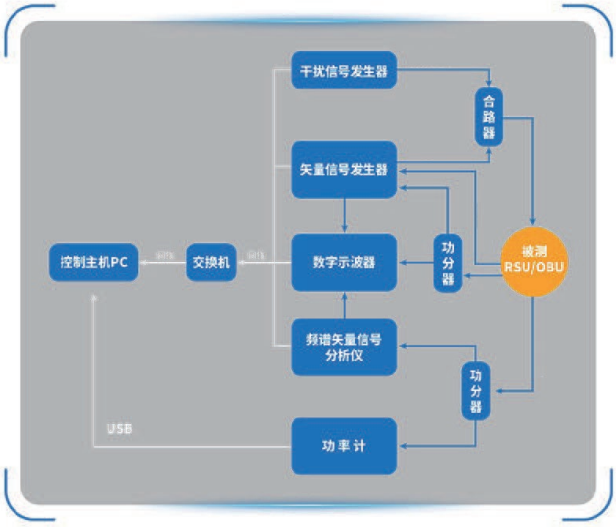
2. System Introduction

The RSU & OBU automated testing system is a professional testing system composed of main control software ETC Runsys and hardware testing devices.

All core devices in the system can be remotely and automatically controlled via ETC Runsys software. The software realizes visualization of the DUT (Device Under Test) testing process and data analysis results for easy viewing; the system testing framework features a clear and reasonable process, simplifying logical judgment in the testing flow. The system supports efficient testing of RSUs and OBUs in accordance with the national standard GB/T 20851.5-2019.

The hardware testing devices mainly use domestic instruments, including spectrum analyzers, vector signal analyzers, oscilloscopes, vector signal generators, interference signal generators, power meters, and servers, supporting Chinese operation interfaces for convenient function debugging and application testing. The hardware in the system can also be flexibly configured based on customers' existing devices.

2.1 System Framework



As shown in the system framework diagram above, a PC installed with core control software ETC Runsys connects to the hardware devices in the system via a switch. The software configures the devices in the system and controls signal transmission/reception to perform

automated testing on RSUs and OBUs.

2.2 Core Testing Indicators

RSU Testing Items

- Carrier frequency, frequency tolerance
- Occupied bandwidth
- E.I.R.P (Equivalent Isotropic Radiated Power)
- Spurious emission
- Adjacent channel power leakage ratio
- Modulation mode, modulation coefficient
- Bit rate
- Receiving sensitivity
- Receiving bandwidth
- Maximum input signal power
- Co-channel interference rejection ratio
- Adjacent channel interference rejection ratio
- Blocking interference rejection ratio
- BER (Bit Error Rate)
- Preamble
- Postamble

OBU Testing Items

- Carrier frequency, frequency tolerance
- Occupied bandwidth
- E.I.R.P (Equivalent Isotropic Radiated Power)
- Spurious emission
- Adjacent channel power leakage ratio
- Modulation mode, modulation coefficient
- Bit rate
- Wake-up sensitivity
- Wake-up time
- Receiving sensitivity
- Receiving bandwidth
- Maximum input signal power
- Co-channel interference rejection ratio
- Adjacent channel interference rejection ratio
- Blocking interference rejection ratio
- BER (Bit Error Rate)
- Preamble
- Postamble

2.3 System Advantages

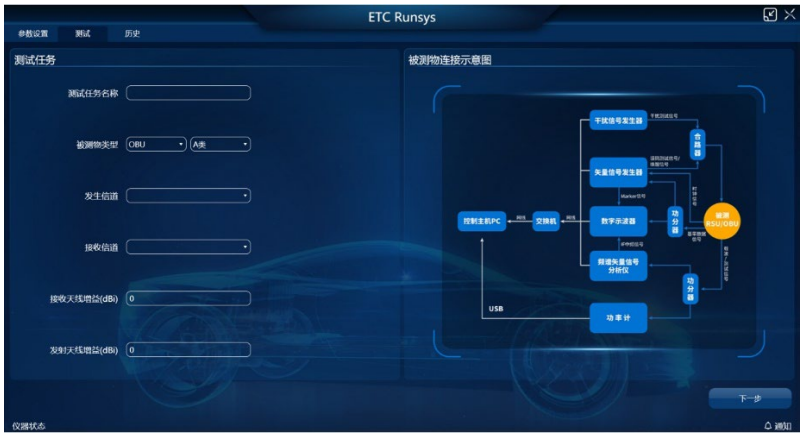
3. Introduction to ETC Runsys Software

ETC Runsys completes testing by controlling devices in the system. It can remotely manage and control reference measuring instruments in the system, achieving semi-automated testing, automatic reading, analysis, and output of test results. For each functional test, it provides prompts on how to operate RSUs and OBUs, enabling various predefined automatic tests for RSUs and OBUs. The following introduces some functions of ETC Runsys software:

- Parameter Settings

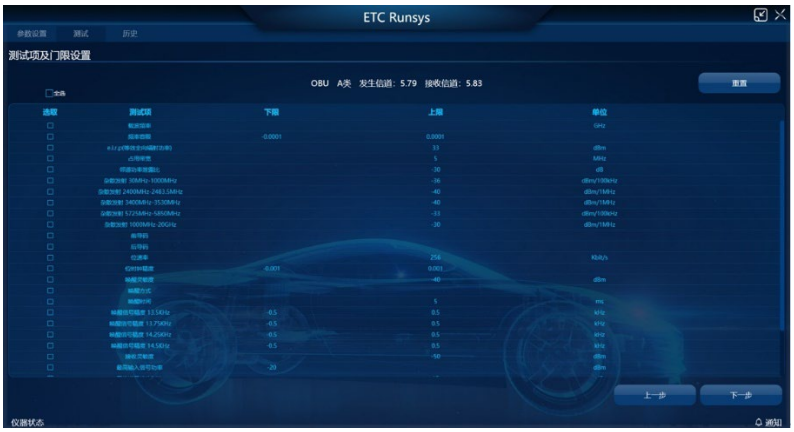
The parameter settings function allows configuring different testing devices and their corresponding models. After configuration, enter the IP of the corresponding device to connect and control it. After connecting testing devices, calibration data of testing instruments can be imported as needed to ensure the accuracy of subsequent test results.

- Testing and Test Results



On the testing task interface, new testing tasks can be added according to the type of DUT,

and the physical link can be checked for correct connection based on the DUT connection diagram.



On the testing interface, testing indicators can be selected for different DUTs. The software automatically sets default upper and lower thresholds according to GB/T 20851.1 based on device information; custom testing thresholds can also be set for different indicators as needed. After starting the test, the software prompts whether the test results pass according to the testing thresholds.

ETC Runsys测试报告

历史任务: OBU TypeA 0

序号	测试项		下限	数值	上限	单位	测试状态
1	载波频率		----	5,770,180,000 (Hz)	----	GHz	通过
2	占用带宽		----	39.58	5	MHz	未通过
3	频率容限		-0.0001	3.4231433506044904E-09	0.0001		通过
4	e.i.r.p(等效全向辐射功率)		----	0.00	33	dBm	系统内部错误
5	杂散发射	30MHz-1000MHz	----	-74.16	-36	dBm/100 kHz	通过
		2400MHz-2483.5MHz	----	-83.45	-40	dBm/1M Hz	通过
		3400MHz-3530MHz	----	-72.75	-40	dBm/1M Hz	通过
		5725MHz-5850MHz	----	-71.38	-33	dBm/100 kHz	通过
		1000MHz-20GHz	----	-30.85	-30	dBm/1M Hz	通过
6	邻道功率泄露比		----	0.00	-30	dB	未通过

Test results can be saved as test reports, exporting information including the serial number of test status and values, task items, lower limits, values, upper limits, units, test status, and the test task name and DUT type of the testing task.

- Historical Tasks

The historical interface allows viewing stored data results of past tests. When there are many historical testing tasks, a specific historical task can be found via search functions by DUT type or keywords. In this interface, past testing tasks can also be deleted and managed.

The RSU & OBU testing system combined with ETC Runsys and hardware devices realizes testing of RSU and OBU products with its complete testing process and rich testing functions. Its flexibility also makes the entire system easier to upgrade and maintain, providing a reliable solution for RSU and OBU testing.